

at least one source contact land disposed atop a plurality of said [at least one] source contact [plug] plugs, wherein said at least one source contact land [has a larger cross-sectional area] is wider than said at least one source contact plug;
a second barrier layer disposed over said first barrier layer;
at least one upper source contact extending through said second barrier layer, wherein said at least one upper source contact is in electrical communication with said at least one source contact land; and
at least one upper drain contact extending through said second barrier layer, wherein said at least one upper drain contact is in electrical communication with said at least one drain contact land.

28. (Twice Amended) The [bipolar transistor] semiconductor device of claim 21, wherein said at least one upper drain contact extends between at least two drain contact lands.

REMARKS

The Office Action mailed June 2, 2000, has been received and reviewed. Claims 1 through 28 are currently pending in the application. Claims 2, 11 through 18, and 20 are withdrawn from consideration as being drawn to a non-elected invention. Claims 1, 3 through 10, 19, and 21 through 28 stand rejected. Applicant has amended claims 1, 3, 4-10, 19, 21, and 28, and respectfully requests reconsideration of the application as amended herein.

Objections to Specification

The title of the invention is objected to as not being descriptive and containing method language. The title has been amended, as set forth above, to overcome such objection.

The disclosure is objected to because of certain writing informalities. The disclosure has been amended, as set forth above, to overcome such objection.

35 U.S.C. § 112 Claim Rejections

Claims 5 through 10 and 23 through 28 stand rejected under 35 U.S.C. § 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. More specifically, claims 5 through 10 and 23 through 28 stand rejected because the specification is allegedly silent in regards to the source/drain contact plugs, contact lands and upper contacts extending between multiple source/drain regions, contact plugs and contact lands. Applicant respectfully traverses this rejection, as hereinafter set forth.

Claims 5 through 6, and 23 through 24 involve source/drain contact plugs extending between multiple source/drain regions. More specifically, claims 5 and 23 specifically recite "at least one source contact plug extends between at least two source regions." Similarly, claims 6 and 24 specifically recite "at least one drain contact plug extends between at least two drain regions." Support for these claims is found in the specification at page 7, line 23 through page 8, line 2, and at page 13, line 21 through page 14, line 9, and in FIG. 7. The specification specifically recites that "preferably, the first vias 136 are formed as long, slot vias 142, as shown in FIG. 7, as the first conductive material 146 in each slot via will span multiple source or drain regions and, thereby, dissipate an ESD more efficiently." *Specification* at p. 14, lines 7-9. As described and illustrated, the first vias 136 span more than one source or drain region. The first conductive material 146 isolated in the first vias 136 form the source or drain contact plugs 148. Because the first vias 136 span more than one source or drain region and the first conductive material 146 fills the first vias 136 forming contact plugs 148, the source or drain contact plugs necessarily extend between at least two source regions. Therefore, the specification sufficiently describes the subject matter of claims 5-6, and 23-24.

Claims 7 through 8 and 25 through 26 are directed at source or drain contact lands extending between at least two source or drain contact plugs. The specification describes this subject matter at page 8, lines 12-14, and at page 14, line 10 through page 15, line 2, and in FIGS. 14 and 15. The specification specifically recites that "it is preferred that the contact lands extend

over multiple source or drain regions to assist in the dissipation of an ESD." *Specification*, page 8, lines 12-13. The specification also states that:

FIG. 15 is the resulting intermediate structure 160 wherein long, slot-type openings are utilized to form long, contact lands 162 spanned over multiple source regions 106 (shown in shadow) and multiple drain regions 108 (shown in shadow), respectively (active areas 114, transistor gate members 112, and contact plugs 148 (formed in the long, slot vias 142, as shown in FIG. 7) are also shown in shadow for visual orientation).

Specification, p. 14, line 25 through p. 15, line 2 (emphasis added). Therefore, the subject matter claimed in claims 7, 8, 25, and 26 is sufficiently disclosed to enable someone skilled in the art to make or use the invention.

Similar to the source and drain contact plugs, claims 9 through 10 and 27 through 28 are directed towards upper source or drain contacts extending between at least two source or drain contact lands. The specification describes this subject matter at page 15 lines 7 through 20 and in FIG. 22. As described with reference to claims 5-8 and 23-26 above, it is preferred that a plurality of the transistors are formed in parallel such that long, slot-type openings in the barrier layers are formed, thereby exposing connections to multiple source or drain regions and contact lands. Furthermore, the subject matter of claims 9, 10, 27, and 28 are inherent in the specification because of the descriptions of the vias used to form the subject matter of claims 5-8 and 23-26.

The specification adequately describes the subject matter claimed in claims 5 through 10 and 23 through 28. Therefore, the 35 U.S.C. § 112, first paragraph rejection of these claims should be withdrawn.

Claims 3 through 10 and 21 through 28 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Applicant respectfully traverses this rejection, as hereinafter set forth.

Applicant has amended claims 3 through 10, 21, and 28 to overcome the 35 U.S.C. § 112, second paragraph rejection. Claims 3 through 10 and 21 through 28 are in allowable form and Applicant respectfully requests allowance of the claims.

35 U.S.C. § 102(b) Anticipation Rejections

Anticipation Rejection Based on U.S. Patent No. 5,686,760 to Miyakawa

Claims 1, 3, 4, 19, 21, and 22 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Miyakawa (U.S. Patent No. 5,686,760). Applicant respectfully traverses this rejection, as hereinafter set forth.

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *Verdegaal Brothers v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). The identical invention must be shown in as complete detail as is contained in the claim. *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

Miyakawa discloses a wiring structure in a semiconductor device, and preferably a copper based wiring structure formed by reflow of copper over a semiconductor device. The invention of Miyakawa is a diffusion preventing barrier metal film disposed in a contact or via hole of a semiconductor device which allows the reflow of copper in the hole to form a wiring structure contact. The anticipation rejection is based upon the assumption that the diffusion preventing barrier metal film of Miyakawa is the same as the contact land of the present invention. This is not the case.

Claim 1 of the present invention has been amended to recite "a contact land disposed atop said contact plug wherein said contact land is wider than said contact plug and is substantially planar" as described in the present application. *See, Specification*, p. 8, lines 8-12 and p. 14, lines 16-20. Miyakawa does not describe a contact land, let alone a contact land such as that claimed in claim 1. Although Miyakawa describes an alloy film 51, the alloy film 51 is not the equivalent of a contact land of the present invention for a number of reasons. First, the alloy film 51 is a barrier metal layer applied to base and sidewalls of a via hole to facilitate reflow of copper in the formation of a wiring structure. As such, it is not a separate element like the contact land of the present invention, but is rather part of a contact plug extending through a barrier layer. This is evident because the alloy film 51 is integral with the contact plug material 61 of the Miyakawa

invention. The alloy film 51 does not "provide a bigger 'target' for the etch through [a new barrier layer]" as the contact lands of the present invention. *See, Specification*, p. 8, lines 21-23. The failure of Miyakawa to describe an element such as the contact land claimed in claim 1 precludes an anticipation rejection. *See, Verdegaaal Brothers v. Union Oil Co. of California*, 2 USPQ2d 1051 (Fed. Cir. 1987).

Furthermore, Miyakawa does not describe a substantially planar contact land as claimed in amended claim 1. The alloy film 51 described and depicted in the Miyakawa reference covers the base and the sidewalls of a via hole. Thus, even if the alloy film 51 could be construed as a contact land, Miyakawa fails to describe a substantially planar contact land as in the present invention. This also precludes an anticipation rejection. *See, Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913 (Fed. Cir. 1989).

Claim 3 is similarly amended herein such that the contact lands claimed are also substantially planar. As pointed out in reference to claim 1, the alloy film 51 of Miyakawa fail to anticipate the contact lands, and especially substantially planar contact lands. For the same reasons as recited above, Miyakawa does not anticipate independent claim 3.

Claim 4 is not anticipated because it depends from non-anticipated claim 3. Furthermore, claim 4 recites drain contact metallization and source contact metallization which is not expressly or inherently described by Miyakawa. The rejection of claim 4 is based upon the assertion that a tungsten film 10 shown in a multilayer wiring structure is the equivalent of the contact metallization claimed in claim 4. It is not. Instead, the tungsten film 10 is only an additional wiring structure similar to the wiring structures upon which it is stacked. Miyakawa does not distinguish a difference between the tungsten film 10 and the other wiring structures and certainly does not describe contact metallization as claimed in claim 4. Claim 4 is not anticipated.

As with claims 1 and 3, claim 19 has been amended to recite a contact land which is substantially planar. For the same reasons as recited above, claim 19 is not anticipated by Miyakawa, and should be allowed in its amended form.

Claim 21 has been amended to recite a contact land disposed over more than one source contact plug. Specifically, claim 21 now recites "at least one source contact land disposed atop a plurality of said source contact plugs" which is not disclosed by Miyakawa. Besides failing to describe a source contact land, Miyakawa does not describe a source contact land disposed atop a plurality of contact plugs as now recited in claim 21. Therefore, Miyakawa does not anticipate claim 21.

Claim 22 depends from claim 21. As a dependent claim, claim 22 is not anticipated because the independent claim from which it depends is not anticipated. Furthermore, claim 22 recites drain contact metallization and source contact metallization which is not described by Miyakawa. As with claim 4, claim 22 is not anticipated by Miyakawa for these reasons.

For the foregoing reasons, claims 1, 3, 4, 19, 21, and 22 are not anticipated by Miyakawa and should be allowed over the anticipation rejection under 35 U.S.C. § 102(b), and passed for issue.

Drawings

Applicant will file corrected formal drawings upon receipt of a Notice of Allowance and Issue Fee Due in the application.

ENTRY OF AMENDMENTS

The amendments to claims 1, 3, 4-10, 19, 21, and 28 above should be entered by the Examiner because the amendments are supported by the as-filed specification and drawings and do not add any new matter to the application.

CONCLUSION

Claims 1, 3 through 10, 19, and 21 through 28 are believed to be in condition for allowance, and an early notice thereof is respectfully solicited. Should the Examiner determine that additional issues remain which might be resolved by a telephone conference, he is respectfully invited to contact Applicant's undersigned attorney.

Respectfully Submitted,



Devin R. Jensen
Registration Number 44,805
Attorney for Applicant
TRASK BRITT
P.O. Box 2550
Salt Lake City, Utah 84110
Telephone: (801) 532-1922

DRJ/ps:jb

Date: September 28, 2000

NA22693522\Amendment.wpd